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Bulk Feeding of Caps and Lids Lowers Cost and Increases Throughput

Often overlooked as a minor area of consideration, the process of feeding caps and lids into a capping machine is turning out to be an important area for boosting efficiency and productivity on a bottling line. Whether your organization is planning a new packaging line or looking for a cost effective means of improving an existing one, investigate bulk cap feeding systems as an alternative to individual case feeding. In the right application, a bulk feeding system can:

- Reduce labor and material handling
- Cut down the incidence of repetitive motion and other lost-time injuries
- Create a cleaner environment around the capping operation
- Improve sustainability measurements
- Increase throughput
- Lower overall cost

Case feeding dissected

To understand when, where, and why to consider bulk feeding of caps, it is necessary to look closely at the steps taken in case feeding. The process begins when an operator takes a corrugated shipping case, containing something close to 40 pounds of caps per case, from a pallet. He or she slits the case with a box cutter and opens an inner poly bag. Since most sorting and orientation systems are gravity fed, the operator climbs a ladder and dumps the case-sized load of caps into a feed bowl at the top of the cap sorter. Later, the operator separates the poly bag from the corrugated case, places the bag in one receptacle, and knocks down the box for recycling.

The burden of keeping sorters filled with caps is relatively light when running small cap sizes at low line speeds, whereby the operator may have to repeat the opening, climbing, dumping, and disposing process only two or three times an hour. To maintain a production line running large size caps or a line running at high speeds, he or she may be up and down the ladder every few minutes handling full cases of closures in order to keep the cap sorter adequately supplied.

A number of issues arise from this labor intensive process. The likelihood of repetitive motion injuries and other lost-time accidents from falls and cuts increases. The operator has less time to monitor the capping machine and ensure maximum throughput. As case after case is slit open and then broken down, fiber-based dust particles fly into the air. Full cases have to be moved into the area by a forklift or hand truck, and recyclables and waste packaging taken out. These operations are not only labor intensive and require a large amount of space, but also stir up more dust.

Go out and observe what's happening at the capping machine. If the operator is hoisting cases up a ladder two or three times every 15 minutes, it's time to consider bulk feeding for an existing capping operation.

Bulk feeding detailed

Bulk feeders can either be located adjacent to the capping machine if floor space permits, or can be located remotely, typically in a part of the plant with easy forklift access to consumables. There are two elements common to every bulk feeding system — a bulk storage bin that contains from 30 minutes to 2 hours of cap supply, and a conveyor to deliver those caps to the cap sorter located at the capping machine. For applications where caps can be purchased in totes, a tote dumper will also be employed.

The following two examples illustrate how bulk feeders are applied.

A powdered drink company planned to introduce a new plastic bottle for its popular instant ice tea mix. A filler and capper for the plastic bottle were installed. The bottle required a large 97mm cap. The large cap size and a run rate of 380 bottles a minute meant that manual case loading to a feed bowl at the top of the machine was simply too labor intensive and slow. Locating a bulk feed bin at the machine was not practical due to inadequate floor space and traffic patterns.
Zalkin engineers designed a bulk feeding system located 100 feet from the capper. The system consisted of a tote dumper, bulk bin, and conveyor. A forklift operator delivers a pallet sized, reusable tote to the tote dumper once or twice an hour. The driver engages the dumper, which upends the contents of the bulk tote into the bin. A belt-transport conveyor carries the caps to the sorting bowl 100 feet away.
This process is less labor intensive than case feeding and frees an operator on the line for value adding duties. Having the bin within easy access to forklifts means more efficient material handling and also a cleaner environment at the filling line. The pallet sized totes are a more sustainable option than individual corrugated cases. The totes offer greater cube utilization, reuse, and less total packaging sourced, transported, and recycled through the supply chain. Options for collapsible totes potentially mean even greater efficiency during back hauling. Buying in bulk can also offer economies of scale in purchasing.

At a fruit juice concentrate plant, a new plastic can for frozen juice concentrate was to replace a fiber can. Floor space at the capper was at a premium so the bulk feeders would have to be located remotely. Line speed for the new cans was set for 800 units a minute. To keep the lid pipeline filled, two bulk feeding bins were designed by Fowler with each located approximately 80 feet from the capping machine. Because the plastic lids were soft and easily damaged, loading the bins by case rather than bulk tote was the optimum solution. A cap sorter was located at each bulk storage bin. After sorting, single lane pneumatic conveyors transport the oriented lids to the capper. The 80-foot-long conveyors function as lid accumulators to ensure that sufficient numbers of lids are always available on the high speed line.

Facts about conveyors

These two application summaries point out several critical considerations about conveyors. Pneumatic conveyors are used to transport a single row of oriented caps. These conveyors can be designed to go up, down, right, or left to conform to space and location considerations at a plant. This configuration also allows the bulk feeder and cap sorter to be located remotely, away from the wash-down environment of the filling room. Remotely locating the cap sorter is an especially attractive alternative for high speed production lines as the cap "airveyor" provides an accumulation source of properly oriented caps that can allow the capper to remain running even when tending to a jam that occurs in

the cap sorting system.

Wide, belt-based conveyors transport a number of unsorted caps abreast. Each time there is a change in direction, the caps have to be transitioned to a second conveyor located at a lower height. This means that belt conveyors making a number of transitions require more ceiling height compared to pneumatic conveyors. Because there are several abreast, belt conveyors hold more caps per foot. A change to a different sized cap or cap color during a shift means that personnel must clear a fairly large number of caps from the flight, which takes time and requires space. Cap size, line speed, distance, and location of potential remote sites determine whether a belt or pneumatic conveyor is optimum.

For any new, high speed bottling line, a bulk cap feeding system would certainly be specified as an integral part of the project. Companies should not overlook the opportunities for operational savings that bulk cap feeding systems offer for existing lines as well. Bulk systems can be cost-effectively added to existing cappers, either at the capping machine or remotely with minimal disruption to production. An option is to locate multiple bulk bins remotely and have the bank of them serviced by a forklift. Since overhead conveyors do not take up floor space, remote feeding is a highly flexible option for small to large caps. Bulk feeding is not only efficient in terms of labor and material handling, but it also helps to maintain the cleanliness of the fill room.

With the increase in line speeds, the need to lower labor cost, and the push for greater sustainability, bulk systems offer a viable alternative to case feeding. If your organization is planning a new packaging line or looking for an effective means of improving an existing one, consider bulk feeding to provide labor, cost, time and material savings compared to conventional cap feeding.

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